Claim 1. (original) A process of separating a sample comprising:

attaching a different receptor agent to at least two distinct populations of magnetic microspheres with a specific range of magnetic moments;

combining a target sample with said distinct populations of magnetic microspheres containing the different attached receptor agents together for a period of time sufficient to allow for binding between attached receptor agents and target species within said target sample to form one or more receptor agent-target species complexes; and,

re-sorting said distinct populations of magnetic microspheres containing the different receptor agent-target species complexes by passage through a magnetic separator.

Claim 2. (original) The process of claim 1 further including analyzing, for formation of one or more receptor agent-target species complexes within said target sample, each of said re-sorted distinct populations of magnetic microspheres containing the different attached receptor agents.

Claim 3. (original) The process of claim 1 further including, prior to an initial sorting stage, passing said magnetic microspheres through a magnetic field so as to magnetize said magnetic microspheres.

Claim 4. (original) The process of claim 1 wherein said magnetic microspheres are of a size of from about 0.01 micron to about 1000 microns.

Claim 5. (original) The process of claim 1 wherein said magnetic microspheres are of substantially the same dimensions.

Claim 6. (original) The process of claim 1 wherein said magnetic microspheres include magnetic particles of a material selected from the group consisting of a ferromagnetic material and a superparamagnetic material.

Claim 7. (original) The process of claim 6 wherein said magnetic particles are selected from the group consisting of iron-cobalt, iron-platinum, and samarium-cobalt.

Claim 8. (original) The process of claim 6 wherein said magnetic microspheres include magnetic particles and a coating material of a material selected from the group consisting of an organic polymeric material and glass.

Claim 9. (original) The process of claim 6 wherein said magnetic microspheres include magnetic particles and a coating material of polystyrene.

Claim 10. (original) The process of claim 1 wherein said receptor agents are selected from the group consisting of antigens, antibodies, peptides, proteins, nucleic acids, lipids, carbohydrates and enzymes.

Claim 11. (original) The process of claim 1 wherein said forming magnetic microspheres including magnetic particles comprises coating said magnetic particles with a coating material selected from the group consisting of an organic polymeric material and glass.

Claim 12. (original) The process of claim 1 wherein said forming magnetic microspheres including magnetic particles comprises imbedding said magnetic particles within a material selected from the group consisting of an organic polymeric material and glass.

Claim 13. (original) The process of claim 1 wherein said forming magnetic microspheres including magnetic particles comprises immobilizing said magnetic particles on a surface of or within a material selected from the group consisting of an organic polymeric material and glass.

Claim 14. (original) The process of claim 1 wherein said forming magnetic microspheres including magnetic particles comprises:

coating said magnetic particles with a material having a first reactive functionality; and,

reacting said coated magnetic particles with non-magnetic microspheres having a second reactive functionality, said second reactive functionality adapted for reaction with said first reactive functionality.

Claim 15. (original) The process of claim 14 wherein said first reactive functionality is selected from the group consisting of amines, carboxylates, epoxies and one of an affinity pair, and said second reactive functionality is different from said first reactive functionality and is selected from the group consisting of amines, carboxylates, epoxies, and the other of the affinity pair.

Claim 16. (original) The process of claim 1 wherein said distinct populations of magnetic microspheres with a specific range of magnetic moments are obtained from a process comprising forming magnetic microspheres including magnetic particles, said magnetic microspheres adapted for attachment to a receptor agent; and sorting said magnetic microspheres by passage through a magnetic separator so as to separate said magnetic microspheres into a number of distinct populations of magnetic microspheres, each distinct population with a specific range of magnetic moments.

Claim 17. (original) The process of analyzing a sample comprising:

attaching a different receptor agent to at least two distinct populations of magnetic microspheres with a specific range of magnetic moments;

combining a target sample with said distinct populations of magnetic microspheres containing the different attached receptor agents for a period of time sufficient to allow for binding between attached receptor agents and target species within said target sample to form one or more receptor agent-target species complexes;

individually passing said magnetic microspheres in a fluid microsphere suspension into a flow channel and past a magnetic measurement system capable of measuring the magnetic moment of each individual magnetic microsphere so as

to identify to which distinct population each suspended magnetic microsphere belongs; and,

analyzing individual magnetic microspheres in a detection system for detectable properties of receptor agent-target species complexes so as to measure a detectable property of each receptor agent-target species complex.

Claim 18. (original) The process of claim 17 further including, prior to an initial sorting stage, passing said magnetic microspheres through a magnetic field so as to magnetize said magnetic microspheres.

Claim 19. (original) The process of claim 18 further including, after an initial sorting stage and prior to combining a target sample with the number of distinct populations of magnetized, magnetic microspheres containing the different attached receptor agents, demagnetizing said magnetized, magnetic microspheres.

Claim 20. (original) The process of claim 19 further including passing said magnetic microspheres containing the different attached receptor agents in said flow channel through a magnetic field so as to re-magnetize said magnetic microspheres.

Claim 21. (original) The process of claim 20 wherein said magnetic microspheres containing the different attached receptor agents further pass through an alignment field so as to orient said magnetic microspheres in a predetermined direction within said fluid microsphere suspension.

Claim 22. (original) The process of claim 17 wherein said magnetic measurement system comprises one or more magnetic field sensors.

Claim 23. (original) The process of claim 17 wherein said magnetic microspheres are of a size of from about 0.01 micron to about 1000 microns.

Claim 24. (original) The process of claim 17 wherein said magnetic microspheres are of substantially the same dimensions.

Claim 25. (original) The process of claim 17 wherein said magnetic microspheres include magnetic particles of a material selected from the group consisting of a ferromagnetic material and a superparamagnetic material.

Claim 26. (original) The process of claim 25 wherein said magnetic particles are selected from the group consisting of iron-cobalt, iron-platinum, and samarium-cobalt.

Claim 27. (original) The process of claim 25 wherein said magnetic microspheres include magnetic particles and a coating material of a material selected from the group consisting of an organic polymeric material and glass.

Claim 28. (original) The process of claim 25 wherein said magnetic microspheres include magnetic particles and a coating material of polystyrene.

Claim 29. (original) The process of claim 17 wherein said one or more magnetic field sensors are SQUID sensors.

Claim 30. (original) The process of claim 17 wherein said detection system is a flow cytometry system.

Claim 31. (original) The process of claim 30 wherein said flow cytometry detection system employs a laser detection system.

Claim 32. (original) The process of claim 17 wherein said receptor agents are selected from the group consisting of antigens, antibodies, peptides, proteins, nucleic acids, lipids, carbohydrates and enzymes.

Claim 33. (original) The process of claim 17 wherein said forming magnetic microspheres including magnetic particles comprises coating said magnetic particles with a coating material selected from the group consisting of an organic polymeric material and glass.

Claim 34. (original) The process of claim 17 wherein said forming magnetic microspheres including magnetic particles comprises imbedding said magnetic particles within a material selected from the group consisting of an organic polymeric material and glass.

Claim 35. (original) The process of claim 17 wherein said forming magnetic microspheres including magnetic particles comprises immobilizing said magnetic particles on a surface of or within a material selected from the group consisting of an organic polymeric material and glass.

Claim 36. (original) The process of claim 17 wherein said forming magnetic microspheres including magnetic particles comprises:

coating said magnetic particles with a material having a first reactive functionality; and,

reacting said coated magnetic particles with non-magnetic microspheres having a second reactive functionality, said second reactive functionality adapted for reaction with said first reactive functionality.

Claim 37. (original) The process of claim 36 wherein said first reactive functionality is selected from the group consisting of amines, carboxylates, epoxies and one of an affinity pair, and said second reactive functionality is different from said first reactive functionality and is selected from the group consisting of amines, carboxylates, epoxies, and the other of the affinity pair.

Claim 38. (original) The process of claim 17 wherein said distinct populations of magnetic microspheres with a specific range of magnetic moments

are obtained from a process comprising forming magnetic microspheres including magnetic particles, said magnetic microspheres adapted for attachment to a receptor agent; and sorting said magnetic microspheres by passage through a magnetic separator so as to separate said magnetic microspheres into a number of distinct populations of magnetic microspheres, each distinct population with a specific range of magnetic moments.

Claim 39. (original) The process of collecting a sample comprising:

attaching a different receptor agent to at least two distinct populations of magnetic microspheres with a specific range of magnetic moments;

combining a target sample with said distinct populations of magnetic microspheres containing the different attached receptor agents for a period of time sufficient to allow for binding between attached receptor agents and a target species within said target sample to form one or more receptor agent-target species complexes;

individually passing said magnetic microspheres in a fluid microsphere suspension into a flow channel and past a magnetic measurement system capable of measuring the magnetic moment of each individual magnetic microsphere so as to identify to which distinct population each suspended magnetic microsphere belongs; and,

collecting individual magnetic microspheres of at least one distinct population of magnetic microspheres.

Claim 40. (original) The process of claim 39 further including, prior to an initial sorting stage, passing said magnetic microspheres through a magnetic field so as to magnetize said magnetic microspheres.

Claim 41. (original) The process of claim 40 further including, after an initial sorting stage and prior to combining a target sample with the number of distinct populations of magnetized, magnetic microspheres containing the different attached receptor agents, demagnetizing said magnetized, magnetic microspheres.

Claim 42. (original) The process of claim 41 further including passing said magnetic microspheres containing the different attached receptor agents in said a flow channel through a magnetic field so as to re-magnetize said magnetic microspheres.

Claim 43. (original) The process of claim 42 wherein said magnetic microspheres containing the different attached receptor agents further pass through an alignment field so as to orient said magnetic microspheres in a predetermined direction within said fluid microsphere suspension.

Claim 44. (original) The process of claim 39 wherein said magnetic measurement system comprises one or more magnetic field sensors.

Claim 45. (original) The process of claim 39 wherein said magnetic microspheres are of a size of from about 0.01 micron to about 1000 microns.

Claim 46. (original) The process of claim 39 wherein said magnetic microspheres are of substantially the same dimensions.

Claim 47. (original) The process of claim 39 wherein said magnetic microspheres include magnetic particles of a material selected from the group consisting of a ferromagnetic material and a superparamagnetic material.

Claim 48. (original) The process of claim 47 wherein said magnetic particles are selected from the group consisting of iron-cobalt, iron-platinum, and samarium-cobalt.

Claim 49. (original) The process of claim 47 wherein said magnetic microspheres include magnetic particles and a coating material of a material selected from the group consisting of an organic polymeric material and glass.

Claim 50. (original) The process of claim 47 wherein said magnetic microspheres include magnetic particles and a coating material of polystyrene.

Claim 51. (original) The process of claim 39 wherein said one or more magnetic field sensors are SQUID sensors.

Claim 52. (original) The process of claim 39 wherein said detection system is a flow cytometry system.

Claim 53. (original) The process of claim 52 wherein said flow cytometry detection system employs a laser detection system.

Claim 54. (original) The process of claim 39 wherein said receptor agents are selected from the group consisting of antigens, antibodies, peptides, proteins, nucleic acids, lipids, carbohydrates and enzymes.

Claim 55. (original) The process of claim 39 wherein said forming magnetic microspheres including magnetic particles comprises coating said magnetic particles with a coating material selected from the group consisting of an organic polymeric material and glass.

Claim 56. (original) The process of claim 39 wherein said forming magnetic microspheres including magnetic particles comprises imbedding said magnetic particles within a material selected from the group consisting of an organic polymeric material and glass.

Claim 57. (original) The process of claim 39 wherein said forming magnetic microspheres including magnetic particles comprises immobilizing said magnetic particles on a surface of or within a material selected from the group consisting of an organic polymeric material and glass.

Claim 58. (original) The process of claim 39 wherein said forming magnetic microspheres including magnetic particles comprises:

coating said magnetic particles with a material having a first reactive functionality; and,

reacting said coated magnetic particles with non-magnetic microspheres having a second reactive functionality, said second reactive functionality adapted for reaction with said first reactive functionality.

Claim 59. (original) The process of claim 58 wherein said first reactive functionality is selected from the group consisting of amines, carboxylates, epoxies and one of an affinity pair, and said second reactive functionality is different from said first reactive functionality and is selected from the group consisting of amines, carboxylates, epoxies, and the other of the affinity pair.

Claim 60. (original) The process of claim 39 wherein said distinct populations of magnetic microspheres with a specific range of magnetic moments are obtained from a process comprising forming magnetic microspheres including magnetic particles, said magnetic microspheres adapted for attachment to a receptor agent; and sorting said magnetic microspheres by passage through a magnetic separator so as to separate said magnetic microspheres into a number of distinct populations of magnetic microspheres, each distinct population with a specific range of magnetic moments.

Claim 61. (original) A process of detecting multiple analytes in a sample comprising:

exposing a pooled population of subsets of magnetic microspheres to a sample, the magnetic microspheres in each subset having (i) a magnetic characteristic classification parameter that distinguishes the magnetic microspheres of one subset from those of another subset according to a predetermined magnetic measurement and (ii) a reactant specific for an analyte of interest;

passing the exposed pooled population of subsets of magnetic microspheres through an examination zone; and,

determining the identity and quantity of each analyte of interest in the sample by substantially contemporaneously (i) collecting data relating to the magnetic characteristic classification parameter, (ii) collecting data relating to the presence or absence of a complex formed between the reactant and an analyte of interest specific to the reactant, (iii) classifying each magnetic microsphere to its subset according to its predetermined magnetic measurement, and (iv) quantifying the amount of complex associated with each subset.

Claim 62. (original) The process of claim 61 wherein at least one analyte of interest is selected from the group consisting of antigens, antibodies, peptides, proteins, nucleic acids, lipids, carbohydrates and enzymes.

Claim 63. (original) The process of claim 61 wherein results of said process are displayed in real time.